MISSOURI BOTANICAL GARDEN

Bulletin

November 1960
Volume XLVIII
Number 9

Imai-no-hanagaki

COVER: IMAI-NO-HANAGAKI. A beautiful old Japanese variety of Chrysanthemum, white and red in color. Drawing from Kikkwa-Meijisen, Tokyo, Japan, December 1891. The prefix "Imai" denotes the originator of the variety.

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Office of publication: 306 E. Simmons Street, Galesburg, Illinois.

Editorial Office: Missouri Botanical Garden, 2315 Tower Grove Avenue, St. Louis 10, Missouri.

Published monthly except July and August by the Board of Trustees of the Missouri Botanical Garden. Subscription price: $3.50 a year.

Entered as second-class matter January 26, 1942, at the post-office at Galesburg, Illinois, under Act of March 3, 1879.

Missouri Botanical Garden Bulletin

Vol. XLVIII No. 9 NOVEMBER 1960

HOW NATURE PREPARES FOR WINTER

F. W. WENT

NATURE, in preparing herself for winter, seems to be guilty of an enormous waste in the form of great masses of discarded leaves, the dying of above-ground parts of perennials, and the wholesale death of annual plants. Yet this waste is inevitable since, in most plants, the leaves are so sensitive to adverse winter conditions that they could not survive. However, if we consider the autumnal leaf fall from all angles, it does not turn out to be so wasteful as it seems at first glance. It might even be said that it is a blessing in disguise.

An annual plant dies in less than a year after it germinates, but only after it has finished its life cycle. After having produced seeds, through which the species can continue, it has fulfilled its mission, and even if by some chance the mother plant survived the winter, it would not produce more, or earlier, seed than seedlings germinating next spring. In these annuals, the effort to produce seed is usually so great that not only all food produced in previous months is used up, but also the substance of the stem and leaves is drained from them. Thus they wither prior to complete seed maturity.

Food Drainage

You can observe in the agave and in many kinds of yucca, clear examples of such complete drainage of all living substance from the leaves and trunk. While the plant is still flowering, the leaves start to shrivel, and this shrivelling, which indicates progressive emptying of the leaf cells, continues until at seed maturity the rest of the plant is dead. All life has flowed towards the seed. Corn stems and leaves contain much excess food, before the seeds have matured. When these are harvested they can be silaged, producing excellent cattle fodder. But once the seeds have matured, very little food is left in stem and leaves.

In perennial plants and deciduous trees, the plant seldom flowers or fruits itself to death. The leaves usually stay on for some time after maturity of the fruit. This is essential for survival of the plant. The fruit production of a cherry, peach, or plum often takes most of the strength from the tree, and the spent storage food has to be replenished. This is accomplished during a few months of intensive photosynthesis after the fruit has become ripe.

Food Storage

But this is not all. Just prior to the turning of the color in leaves of deciduous trees, they start to mobilize their most important constituents. By the time the leaves drop, they are not

much more than empty containers. Attached to the tree they were active factories, provided with all machinery necessary to produce food and other essential chemicals. They also had some storage space, where the manufactured products could be kept until they were transferred to more permanent storage. In autumn, the most valuable components, which could not easily be replaced, are moved out of the leaves to branches and trunk. They are then available when new factories have to be installed next spring, when new leaves develop. The most valuable parts are nitrogen-containing compounds (especially proteins), potassium, and phosphorus. These are moved out of the leaves, and this causes the well-known change in color. The green chlorophyll, containing nitrogen, is decomposed, so that only the yellow and orange carotenes are left, and the leaves turn yellow. The sugars and starch are moved out of the leaves. What is left are, mainly, the cellulose of the cell walls, some calcium, the yellow carotenes, and some other materials which are either too hard to move, or which are not very essential.

The dry leaves which drop off in the first autumn winds, after turning color, are really empty shells. This is also indicated by the fact that they decompose very slowly. If they were full of proteins and sugars, such as green leaves are, bacteria would feast upon them, and they would rot rapidly on the moist ground. Fresh leaves, such as grass clippings, put in a compost or leaf mold pile, disintegrate rapidly. But the dead autumn leaves take much longer to decompose. When they are mixed with fresh manure and other materials nutritious to bacteria, they rot more rapidy, but left to themselves nothing much happens. They have become inert. The removal of nitrogen, potassium, and phosphorus from older leaves also occurs in annual plants, but only when there is a deficiency of these nutrients in the soil. A plant starving for nitrogen will have its buds and young leaves grow at the expense of the nitrogen in the older leaves, which is moved out. This causes the older leaves to turn yellow and drop off. But in case of a calcium deficiency, the older leaves do not turn yellow and die, because calcium cannot be removed from older leaves. This is also true in the autumn drop of leaves. They fall off still retaining their full content of calcium.

During the Indian summer in the east, but also to some extent during the Fall in the west, leaves of sumac, Virginia creeper, and sweet gum turn a brilliant red or purple. This color is due to the formation of a pigment, anthocyanin, which usually is produced in cells full of sugar. The reddening of the leaves is an indication that their sugar content has gone up. This increase in sugar is usually due to transformation of starch into sugar. The insoluble starch cannot be moved as such. It first has to be changed to sugars which are easily soluble and can thus flow out of the leaves. Formation of sugar from starch occurs rapidly when the temperature drops to near freezing. Therefore, the red colors of the Indian summer flare up after the first cold nights. The cold is the signal, for trees and shrubs, that

winter is approaching, warning them to start emptying their leaves before it becomes too cold. They rapidly dissolve their starch, and the resulting high sugar content causes the formation of the red and purple anthocyanins.

Colors

This effect of cold on red pigment formation explains why the red autumn colors in the east are so intensive while in Pacific Coast regions they are seldom of the same intensity. Plants there, are very rarely exposed to near-freezing temperatures before they have lost their leaves. Autumn colors there, are of the rich golden and yellow types, due to the loss of chlorophyll which normally masks the yellow carotenes.

This also teaches us a lesson about pruning the older leaves of a healthy plant. During the life span of a leaf, there first comes a period when it is growing rapidly and is using much more food than it can make. The second period is the longest. During that time, the leaf's chemical factory is working full blast, and it provides the rest of the plant with food and hormones. The last period sets in as the color begins to change. The factory is dismantled, storerooms are emptied, and all is moved toward the branch. The amount of food and material which becomes available in this way may equal weeks of activity of the leaf in its second period. Therefore, cutting leaves off just because their color is not lush green any more may deprive the plant of huge supplies just ready to be shipped. Usually the leaf drops off by itself at the proper time, through the aid of a very neat mechanism.

Where the leafstalk joins the stem or branch, there exists a layer of cells which are inactive so long as the leaf is active. The activity of the leaf is registered on these cells by the auxin, or plant-growth hormone, which is formed by the leaf. As soon as the flow of auxin stops, this layer of cells becomes active. The cells separate from each other, and in a few days, this layer has become so weak that the leaf, plus leaf stalk, breaks off at a slight touch or a breath of wind. As a leaf grows older, it forms less and less auxin. A leaf, after turning yellow, produces no more auxin, and therefore the leaf drops a few days after it has changed color.

AN EXECUTIVE'S GARDEN

KENNETH O. PECK

In the rural areas surrounding a metropolis of any size, the inevitable succession of events can be briefly expressed as forest and prairie giving way to carefully staked out, asphalt-lined subdivisions and shopping centers. The inhabitants of these vast, treeless expanses of real estate, sensing some sort of void, are curiously turned to enhance their new environments by planting trees, shrubs, and geraniums or petunias — that is, if their new homes are not already equipped with silver maples or Chinese elms, and Pfitzer junipers.

The art of gardening, among others, can certainly be placed among the earlier "do-it-yourself" activities which, in the present day, seem to have taken a fairly firm stranglehold on the nation's economy and way of life.

If a person wants a little garden in these times, all he has to do is go to his favorite supermarket, garden shop, hardware, dime, drug or department store, to purchase a plastic-wrapped, seed-imbedded mat which he can lay on a previously scratched patch of ground, either side up. When properly watered, this procedure will give the semblance of a flower border. Or he can take one primitive step backward and buy a plastic box in which seeds have already been sown. He then punches holes in the plastic top and adds water. The depressions are to tell him where to punch the holes. The primitive feature of this method is that the gardener should transplant the resulting seedings to his garden.

Aside from being an art, gardening should be a pleasure but there are many considerations that seem to discourage people from enjoying this pastime. Among these are contemplations of having to keep flower beds and borders weeded, watered, sprayed and fertilized; the ferreting out of the several products from the many marketed, all of which claim to give the consumer an award-winning garden if used according to directions, and which are best suited to help the gardener to have the best-looking, most vigorous, "varmint-free" border on the block. This is not all. Conflicting free advice from neighbors, friends and other people who are supposed to know, is often quite enough to discourage anyone aspiring to have a green thumb. Here is an excellent instance in which a botanical garden, through its courses in all phases of horticulture, can be of great assistance.

Limited time often prevents some people from having a garden. There are many who say, "I really would like to have a garden, but I just don't have the time". For these people, if they are sincere, there is a type of garden that requires amazingly little time to maintain. In fact, once established, this little garden requires little more than water and gives in return the rewarding pleasure of just looking at it. The kind of gardening to which I refer is a form of rock gardening on a small scale, that is, gardening in a sink. This is by no means an innovation. I have used an old soapstone

laundry sink given to me by a neighbor who, because of the marvel of the automatic washer, was delighted to get rid of the thing. It measures 24″ x 48″ x 15″ deep.

It is hoped that this article about sink type gardens will appeal to our readers. I would not attempt to mislead anyone by saying that setting up a sink garden is an easy task. Moving that 360 pound sink into place from my neighbor's basement was somewhat akin to playing tiddywinks with manhole covers. One need not use a laundry sink. Natural stone troughs or sinks would be ideal. Or, it is not difficult to make one of concrete.

Since many of the plants that are suitable for the sink cannot be easily purchased, the plants are more simply obtained from seed. Most of the plants mentioned herein have been grown from seed by the writer since January, 1960. In accordance with directions given in several rock gardening books, all seeds were sown in flats on a mixture of equal parts of soil, sand, peat and fine gravel. The seeded flats were placed in a coldframe and watered alternately with tepid water and snow. The results were not as rewarding as would have been desirable, but at least ten of the varieties that did not germinate were those known to give trouble. In the light of the difficulty encountered, I would recommend sowing seeds on a sterile medium such as milled Sphagnum moss in separate, shallow clay or plastic pots 4 to 7 inches in diameter.

Minature garden in an old soapstone sink.

Seeds of certain genera require exposure to alternate freezing and thawing temperatures in order to break dormancy, dictating the time of seed sowing which should be observed between mid-December and early February. Some seeds in this category are: *Achillea, Androsace, Cotyledon, Draba, Gentiana, Globularia, Lewisia, Nemastylis, Primula, Saxifragra,* and certain species of *Alyssum* and *Penstemon.*

Seeds of the following may also be sown outside but also germinate freely inside during February without exposure to low temperatures: *Armeria, Calandrina, Campanula, Carlina, Dianthus, Erigeron, Geum, Gypsophila, Lychnis, Platycodon, Silene* and *Veronica.* The seedlings, of course must later be transplanted to other flats of soil. In mid-April, they can be moved to a cold frame or to a sunny, frost-free, protected place. I used a hastily but serviceably - constructed plastic greenhouse which was by no means

airtight, but which offered protection from late frosts and allowed placement of plants in full sun.

In early April, or even in the last part of March, the seeds in the cold frame should be starting to germinate. Germination of the various species will not occur simultaneously, some beginning in March or April, while others will not start until early May. When these seedlings are large enough to handle, they must be transplanted to flats, three inches or more deep, in which they may be kept for several months if freely spaced.

At this point there are several matters to consider about the new plants. First one should be sure that enough individuals — 12 to 15 or more — of each species are kept growing. Secondly a nursery should be planned if it is desired to grow many plants. A plant growing area would be best placed on the east or north side of a building. Whether or not the young plants are kept in flats or are placed in a nursery, the young seedlings must be protected from heavy rains until they have attained a fair size. In any case, provisions for an exceedingly well drained soil must be made. This can be accomplished by mixing equal parts of friable soil, sand, gravel and brown, granulated peat or well-rotted leaf mould.

Gypsophylla repens (left) *Silene alpestris* (right) *Sedum sp.* (upper right). Note neat appearance of gravel mulch.

In selecting a site for the sink, be sure it is a place that receives no more than 4 to 5 hours direct sunlight, preferably before midday. Through the remainder of the day, shade cast by trees or buildings is important, but in no case should the sink be placed entirely in shade under a tree. One should also realize that after its location has been decided upon the sink cannot be moved.

It would be well to set the sink on a mound of flat stones or concrete blocks so that it is level and the top of it is approximately knee-high, or scarcely more than at a toddler's eye-view. If it does not already have one, a drainage hole must be made in the bottom of the sink since standing water in the bottom will become foul if there is no way to change it frequently or constantly, as in the case of the moraine garden.

The sink should be filled with soil well in advance of planting by at least one month. During this time, the fill will settle and additional soil may be added before planting to compensate for settling. The soil level should be within one-half inch of the top. Use small rocks and concrete rubble to fill the first one-third to one-half of the sink, followed by a layer of coarse gravel, a layer of fine gravel, then the recommended soil mixture. After filling, there should be at least 6 to 8 inches of soil for root penetration.

When planting the sink, take the habit of each plant into consideration. Taller plants should be placed in the rear, trailing plants, perhaps near the edge, tufted plants placed to please the individual. One might wonder how it would be possible to grow a suitable number of plants in an area just under 8 square feet, but if the right kinds of plants are used, such an area will accommodate more than two dozen individuals.

It has been said that much of the hardiness of a successfully grown plant in the St. Louis area consists of its ability to withstand cold as well as to tolerate our excessive summer heat. Water, except for conditions of extreme drought or abundance, should never be a problem as long as soil and exposure conditions are ideal. With these thoughts in mind, a description of some of the delightful plants that can be expected to fare well both summer and winter follows. Most of these are easily grown from seed and require no pampering.

Achillea "Little Beauty" — Yarrow. This little composite forms low mats of silvery-wooly, dissected foliage topped by 6-inch sprays of yellow flowers. "Little Beauty" will tolerate partial shade but makes its best showing in full sun. It stays under 2 inches but may cover an area 8 to 10 inches across in one season from seed.

Aster kumleini (also *A. oblongifolius*) is a native from the Dakotas and Montana with blue-purple or pink flowers. Perhaps its 12 inch height might render it a bit tall for the sink garden, but its basal rosettes send up one to several bushy, flower-covered stalks that are really quite beautiful. About one out of ten plants bloom the first year.

Campanula—Bellflower. Members of this genus have long been used in all

types of gardens for their hardiness and free flowering. Three species, all easy from seed, were tried:

C. carpatica, or Carpathian Bellflower, with lavender-blue or white flowers, usually stays under 12 inches, forming compact bushy plants. Seedlings started in February bloom sparingly from July till frost.

C. fragilis has no common name and do not be misled by its specific name—this plant is far from being fragile. Certain individuals bloom the first year from seed, starting in July. Clusters of light blue-purple flowers are borne on prostrate stems trailing from the center of the plant which has almost succulent, very dark green, fan-shaped leaves. It grows to 6 inches high when matured and seems to do well in either sun or shade.

C. garganica from Greece and Italy is another 6-inch plant, with light green leaves arranged in cushions studded with star-shaped blue flowers. It does not bloom the first season, and is just a trifle fussy.

Erigeron montanensis — Fleabane. This is another native from the badlands and high plains. It does not flower the first year and is quite slow growing. The largest plant I was able to grow stands about 1-½ inches tall. The mature plant is 5 inches tall, with many small white, daisy-like flowers. It is easy from seed and commendable because of its low, rosette habit.

Gypsophila repens — Baby's Breath. At first glance, the creeping Baby's Breath suggests a *Dianthus* in appearance, but its gray-green leaves are much shorter than the latter. Once started, the young plants grow quickly but not too aggressively, and may produce a few pink blossoms by the end of the first season.

Lychnis alpina — Campion. This plant, although not flowering the first year, is tough, attractive and apparently heat-resistant. It has a wonderful rosette habit with dark green, stiff, strap-shaped leaves forming a bristly cushion. Mature plants are 6 inches high, producing rosy-pink blossoms in April.

Penstemon — Beardstongue. There are many species and varieties belonging to this genus, but the smaller native species are best suited to the sink and rock garden. Seeds of the species below should be sown outside in the coldframe, and the plants require extremely well-drained soil.

P. glabrescens is really a very dwarf shrub with loosely-spaced, light-green, narrow leaves. The mature plant, with spikes of blue flowers, stands only 5 inches high.

P. procumbens is an evergreen, creeping mat-former to 3 inches, bearing bright blue flowers over tiny, shiny leaves. Part shade, as defined earlier, is required for this species.

P. virens, another mat-forming evergreen, is somewhat larger than the preceding. It produces rich blue-purple flowers to a height of 8 to 10 inches. This species actually requires half shade.

Silene — Catchfly. Three species of this were tried, but only one, S. *alpestris,* grew willingly and flowered the first season. The plant itself grew 3 or 4 inches, high, with white flowered panicles rising to about 6 inches. The other two species, S. *acaulis* and S.

Schafta, grew well for awhile, but many of the plants seemed to die back after growing well for 2 or 3 months. I think they would be worth trying again, however, planting them in a soil mixture of 3 parts sand, 1 part gravel, 1 part soil, and 1 part sifted leaf mould or peat.

Townsendia hookeri (sometimes *T. sericea*), a native composite, should prove to be one of the most delightful additions to any sink or rock garden. The mature plant is a gray-green tuft 4 inches wide, topped with white or pink daisy-like flowers, all under 2 inches.

Veronica—Speedwell. Two species, *V. holophylla* and *V. Repens,* were grown satisfactorily, although neither bloomed the first season. The former is a little on the tall side, but produces slender spikes of densely crowded, bright blue flowers, while the latter is a small blue-flowered creeper which stays under 3 inches. It would also be useful between stones in a patio.

Not to be overlooked are the many attractive native plants that can be found growing in open or uninhabited places around the St. Louis area. To mention a few, there is *Talinum teretifolium,* a succulent producing ephemeral magenta flowers on wiry stalks; *Hypericum gentianoides,* a bushy little 8 to 10 inch shrub, the branches of which are covered with diminutive yellow flowers, and appear to be jointed; and *Selaginella rupestris,* a tiny fern relative. This may have to be purchased and would cost up to $2.00 a clump by mail order.

Bulbs would happily find a place in the sink garden. I would suggest some of the smaller, winter-blooming varieties of Crocus, and miniature species of Narcissus and Tulip which are available from quite a number of seed and bulb dealers.

There are hundreds of plants, other than those described above, that would be very suitable in the sink or rock garden. I would suggest again, that if several people became interested in this type of gardening, they each grow a number of different plants with the idea of exchanging them between one another. This can be done among friends or neighbors, as well as among members of garden clubs.

Plants should be planted carefully so that the crown of each sits about one-half inch above the soil level. When the planting of the sink is completed to satisfaction, the half inch left near the top can be filled with a gravel mulch that should be worked in closely around and under the plants. Not only is the gravel attractive, but it allows the crowns of plants to be well aerated, and serves to hold down weeds.

There are some advantages of the sink garden that are not apparent. For one thing, it is a rather delightful way to get rid of an old, unwanted sink. It is a garden that does not require back-breaking spading each spring, nor does it present a weeding problem. Being above the ground, it is easy to reach and is not bothered by dogs, cats, rabbits and other quadrupeds. Perhaps the single most important advantage of the sink garden is that it does not require regular watering. In the spring when rains are quite frequent, there is little or no need to

water. Later in the summer and fall, when drouth conditions are apt to prevail, one watering per week should suffice. All of this adds up a minimum of care required to maintain the sink garden. Although setting up the sink requires a deal of labor, it certainly is no more work than building a barbecue pit or flagstone patio.

It is only fair to mention some difficulties, although there is no garden of any kind without these. Occasionally, the plants will have to be sprayed for aphids and possibly white-fly. In mid-summer, caterpillars may cause trouble and must be sought for at the first sign of damage. Even though four-legged creatures are no problem, the two-legged ones are, namely; birds and neighbors' children. Any suggested controls for the latter might bring a reign of terror upon the author, so the solutions to these problems are best left to the reader.

Seed Companies

Claude A. Barr Prairie Gem Ranch Smithwick, South Dakota	For seeds, bulbs and plants native to the midwest.
Geo. W. Park Seed Company Greenwood, South Carolina	Primarily for seeds and blubs.
Pearce Seed Company Moorestown, New Jersey	For seeds, bulbs and plants.

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PINK MAIDS

Mrs. Gilbert, a veteran member of the St. Louis Horticultural Society, brought some branched sprays of small pink flowers to Horticultural Society meetings on several occasions. They interested me so much that when she contributed seedlings to the annual plant sale, I bought some and have had them in my garden ever since. I finally identified them as a species of Talinum ordinarily called *Talinum patens*. Flower catalogues however list it as *Talinum paniculatum* which is apparently the accepted name. An old-fashioned and appropriate common name is PINK MAIDS. They seed themselves here and there in my garden and begin to flower in early summer when they are only a few inches high. If given plenty of room and sunlight, they thrive in the St. Louis heat and make graceful bushes almost waist high before the first frost.

At the base they are a typical succulent with thickish green leaves set opposite each other on brittle bright stems. On small plants the leaves are no larger than your thumb nail but on well grown specimens they may be nearly the size of your hand. Young and old, the flowers are borne high above the plant on gracefully branching wand-like inflorescences on which the buds and seed pods shine like tiny bright colored beads. The day before they open, the buds are a bright mulberry pink. After flowering the young seed pod (about the size of a pin head) is a dull mulberry purple, which becomes brighter as the seed ripens until it is almost a bright light red. Then the color fades to straw and the seed pod shatters. These mingled colors in a single inflorescence—mulberry, purple, bright red, and straw, produce an oddly unreal effect, as of multicolored glass beads.

It is these beaded wands of bloom rising high above the clean fresh leaves, that are the plant's chief charm during most of the day. The flowers do not open until late in the afternoon and close in the early dusk of the same day. The open flowers are about half the size of your fingernail and a soft bright pink, which contrasts oddly with the dull purple and bright red seed pods.

The tiny seeds apparently spread all through the garden but the plants have the useful quality of coming up only in empty spaces between other plants and staying quite small unless there is a big gap, as for instance at a place where there have been clumps of daffodils in the early spring, producing a summer bare spot when the leaves died down quickly in late May and early June. For several years I had only a few large plants each year and these were mostly just inside my thick and sturdy evergreen barberry hedge. This last spring I had the hedge cut back severely to keep it within bounds, thus creating a wide open space between the barberry plants and the macadam walkway at the side of my garden. After the early crocuses had died down, this was a bare stretch of chopped wood mulch until the Pink Maids began to come up here and there along the whole stretch of it, rejoicing

in having found at last a sunny spot very much to their liking. During the summer, delivery trucks have backed into them or autos have run over them creating great havoc among the brittle succulent stems and leaves but when cut back cleanly they recover in just a few days and branch out more vigorously than before they were injured.

I became so interested in my bright little PINK MAIDS, that I looked them up in the library and the herbarium to learn that they are native to rocky and sandy places from Mexico to Chile. In the tropics and subtropics they develop into succulent shrubs which are actually woody at the base. In Europe they have been quite commonly grown as potted plants for their foliage and flowers. They are apparently easily grown except that, as in my garden, they demand plenty of light. There is even a variegated form with a white-edged leaf which is grown just as a succulent for the beauty of its foliage. In Belem, on the coast of Brazil, the succulent leaves are gathered in the wild and are sold in the market to be used as a green vegetable. I do not know of any other plant which appears in such an odd variety of habitats (1) as a succulent sub-shrub very widely distributed in the tropics and sub-tropics of the New World, where it is sometimes used as a green vegetable (2) as an ornamental potted plant in European greenhouses (3) as a self-sown annual in an occasional American garden.

—E.A.

GROUNDSEL TREE - SALT BUSH

The Garden has an excellent selection of the Groundsel Tree or Salt Bush as it is known along the seashore, *Baccharis halimifolia*, L. It has been propagated and widely planted in the border plantations near the lily pools. The plant is chiefly of interest for the plumes of snowy white pappus of the fruits in late September and October. The white plumose branches are also attractive when used as fillers and background in flower arrangements.

Baccharis halimifolia, L. and the closely related western species *B. salicina*, Torr. and Gray are hardy in our area. They grow in almost any well drained soil in a sunny position and are well adapted to dry rocky slopes. They will also tolerate brackish soils thus making them valuable for seashore plantings. —E.L.E.

SUMMER NATURE PROGRAM AT THE GARDEN

This summer 472 children registered for the Pitzman Nature Program, which was held for two 5-week sessions, under the trees near the Main Gate. Not all of this large number received their final certificates, as vacations and camps sometimes prevented the children from attending the required number of periods.

This year the classes were held on four mornings of the week, instead of two days a week, with both morning and afternoon classes as in previous years, thus using the cooler hours of the day, which greatly increased the powers of application and interest of the students.

The program followed the same pattern as the two previous years, the members of the St. Louis Audubon Society generously giving of their time to take the classes in Birds, while Mr. Peck and Miss Davies led the classes in Plants and Man, Man's Enemies and Trailfinders. This year we were very ably assisted by five students from local schools, who have been coming to all our classes during the last two years. They have shown such interest and aptitude, we have formed them into a group named "The Assistants' Council". In addition to helping in the classes, they have spent the summer working on a display of fossils which has been set up in the Museum; they hope, during the year to fill the remaining cabinets with similar displays.

In the afternoons, members of the Junior Research Teams, selected from interested students in the morning classes, worked on a number of projects. In the first session, six students studied the structure of different flowers growing 'round the Garden, and then spent several afternoons watching and collecting the insects that visited these flowers, relating them to the fertilization of the flowers. Five very intrigued children fished for, studied under the microscope, sketched and named many of the algae they found in the pond; this was so successful that we repeated it the second session. The third project was a repeat of last year's count and collection of lawn weeds, the account of which was written up in the September '59 BULLETIN.

In the second session, two girls made a good report of the life of the Elm Leaf Beetle and the damage it is doing to our trees. The final project was an anatomical and morphological study of the plants growing around and in our pond; we are pleased to report this was accomplished with only two accidental slips into the marshy pond edge.

We find the interest shown by the children in the Garden's nature classes very gratifying, and are pleased to see many of the same children coming back for the second and third summers. They perhaps will be the botanists of the future—although one seven-year-old has his life very definitely planned for a career in Entomology.

—J.L.D.

FLOWER SHOWS

Annually, beginning with the Fall Season, the Garden presents four major flower shows in the Floral Display House for the benefit of the Friends of the Garden and the general public. These contribute color and interest when the outdoor garden is more or less dormant and less colorful. The first of the displays is the Chrysanthemum Show in November (this year November 6th through December 4th). The Christmas Season is celebrated with a display of Poinsettias and other Christmas-time plants. The Orchid Show in mid-winter will be held this year in cooperation with the first annual Orchid Show of the Orchid Society of Greater St. Louis. It will include many out of town exhibits and have Orchid Society judging. This is one of the more spectacular shows and is eagerly awaited each year by Orchid fans as well as all other flower lovers. The final big show is the Spring Flower Show about Easter time. This show features mainly tulips, narcissi, lilies, other bulbous plants and azaleas. Pictured are views of the Centennial year Chrysanthemum Show last November and the Spring Flower Show of the past season.

During the year are other shows, competitions and festivals sponsored by the various garden clubs and flower societies. Beginning in the Fall these include the Henry Shaw Cactus Society Show, the Dahlia Society Show, the Men's Garden Club Fall Festival; in the Spring the African Violet Show, the Narcissus Society Show and the Rose Society Show; in the Summer the Gladiolus Society Show.

Chrysanthemum Show for the Centennial year 1959

Spring Flower Show April 1960

MISSOURI BOTANICAL GARDEN PROGRAMS

Special Shows and Displays:

Chrysanthemum Show November 6 through December 4.

Poinsettia Display December 11 through January 8.

Free Nature Programs for Children, age seven and over, are held every Saturday morning from 10:00–11:30 A.M. in the Museum Building.

Program for November and December:

Color Sound Movies .... November 5
The Rise of the Forests 12
Woodlands of America I 19
Woodlands of America II 26
Insectiverous Plants ..... December 3
Make Your Own Christmas Decorations 10
Make Your Own Christmas Decorations 17
Color Sound Movies 31

Courses

The following courses are open to any interested person. Certificates are awarded upon the successful completion of any course.

Information on registration may be obtained by calling

PRospect 6-5567

Please send all registration fees to

Missouri Botanical Gardens
2315 Tower Grove Avenue
St. Louis 10, Missouri

Registration fees cannot be refunded after the last day of registration for any particular course.

Course 107

Botany for Home Gardeners

Place: Museum Bldg.

Time: Five Monday nights, 7:30 to 9:30 P.M.

Starting November 14.

Fee: $15 for the five sessions.

The course emphasizes basic structure of both herbaceous and woody plants, the nature of changes which adapt plant parts to particular situations, seed structure and germination of both monocotyledonous and dicotyledonous plants, and familiarization with chromosomes, cell division and sex cell formation. The course will be taught as a laboratory-discussion, and will be built around fundamental observations essential to intelligent understanding and growing of plants. No previous knowledge of plants is required.

Open to all persons of any age seriously interested in plants.

Instructor: Dr. Norton H. Nickerson

Course 128

Modern Horticulture for Home Gardeners II

Place: Museum Bldg.

Time: Five Tuesday nights, 7:30 to 9:30 P.M. Starting November 1.

Fee: $15 for the five meetings.

Complements Course 123 but may be taken independently. Subject matter includes background knowledge essential to really successful growing of many types of plants. An orderly survey of environmental factors which affect plant growth and how the home gardener can manipulate these factors to achieve good growing results. Soil testing and what to do to improve soil conditions found on your property, plant propagation and plant diseases will be included. Each evening will feature both practical and classroom work. Students may take home plant material at end of each meeting.

Instructor: Mr. Robert J. Gillespie

Course 146

Advanced Orchid Growing—How to Make Orchids Flower

Place: Museum Bldg.

Time: November 16, 7:00 to 10:00 P. M.

Fee: $5 for one meeting.

A course for the advanced orchid grower, stressing how environment influences growth and flowering in the major cultivated genera of the Orchidaceae. Lights and other devices for controlling flowering will be explained. There will be a laboratory session followed by a question and answer period.

Instructor: Mr. Robert J. Gillespie.

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AN IMPORTANT MESSAGE TO

Friends of the Garden

Major financial support for the Garden's Second Century Redevelopment Program depends in part upon tripling membership in the Friends, as evidence of community interest. If this is accomplished, the Redevelopment Program can move ahead without delay. Thus each new member has greatly added importance at this time and the Friends have a unique opportunity to provide the most significant help to the Garden in its long history.

If every Friend of the Garden would find one additional member, the 1960-61 membership goal of 7,500 Friends could be more than three fourths met and very substantial funds gained for Shaw's Garden.

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BE A FRIEND AND BRING A FRIEND

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Membership is $10 and up.

For information and membership blanks call or write

FRIENDS OF THE GARDEN
PRospect 6-5567
2315 Tower Grove Avenue
St. Louis 10, Missouri